

Figure.S1 Schematic diagram of $K_5La(MoO_4)_4$ crystal structure from different views (a) normal, (b) a axis, (c) b axis, (d) c axis.

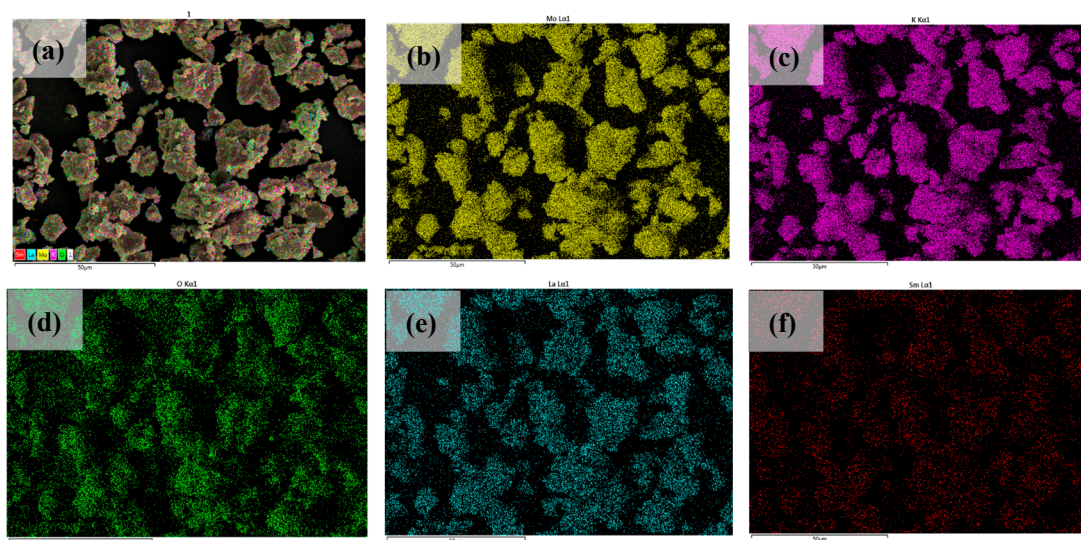


Figure. S2 The Mapping patterns of $K_5La_{0.93}(MoO_4)_4: 0.07Sm^{3+}$ sample: entirety (a), Mo (b), K (c), O (d), La (e), Sm (f)

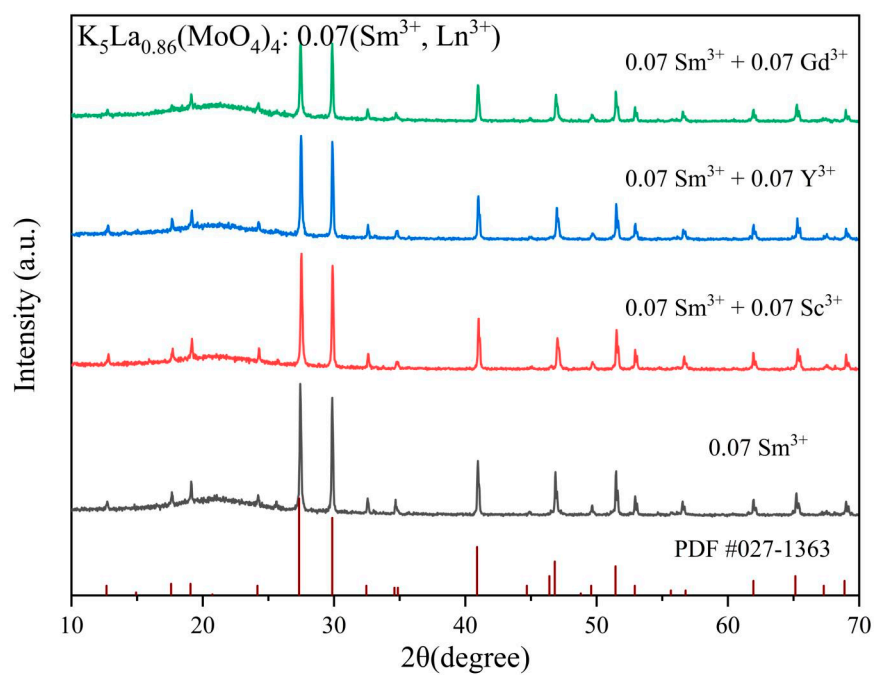


Figure. S3 The XRD pattern of $\text{K}_5\text{La}_{0.86}(\text{MoO}_4)_4: 0.07(\text{Sm}^{3+}, \text{Ln}^{3+})$ phosphors

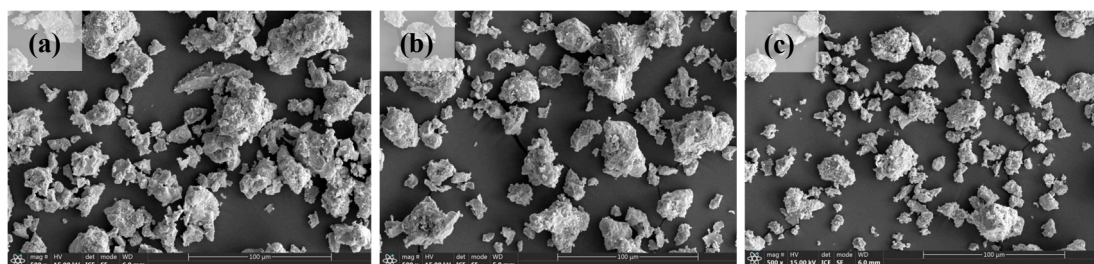


Figure. S4 The SEM photos of $\text{K}_5\text{La}_{0.86}(\text{MoO}_4)_4: 0.07\text{Sm}^{3+}, 0.07\text{Ln}^{3+}$ ($\text{Ln} = \text{Sc}$ (a), Y (b) and Gd (c)) phosphors.

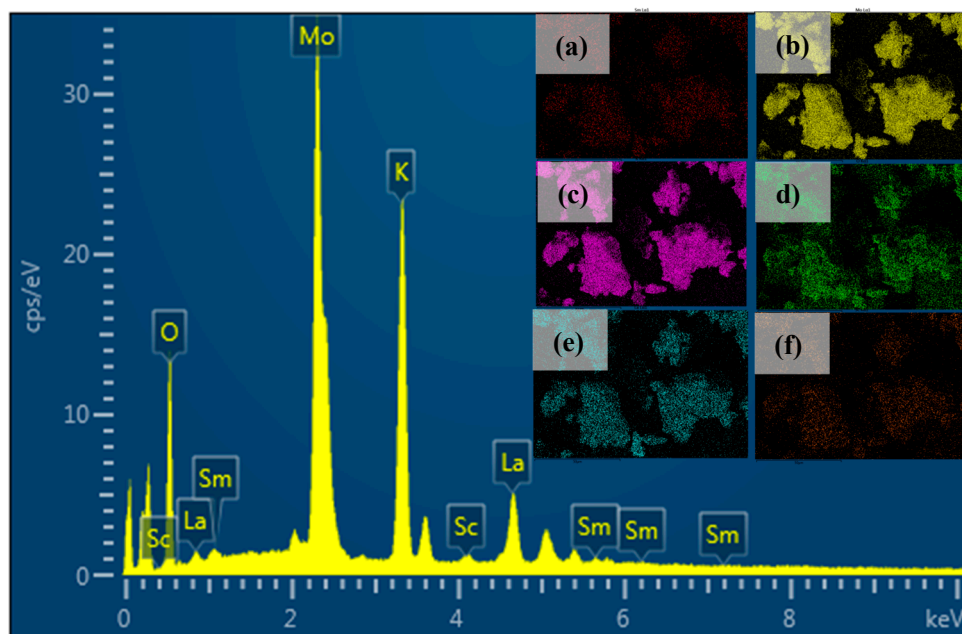


Figure. S5 The EDS and Mapping patterns of $\text{K}_5\text{La}_{0.86}(\text{MoO}_4)_4: 0.07(\text{Sm}^{3+}, \text{Sc}^{3+})$ phosphors (inset a-f): Sm (a), Mo (b), K (c), O (d), La (e), Sc (e).

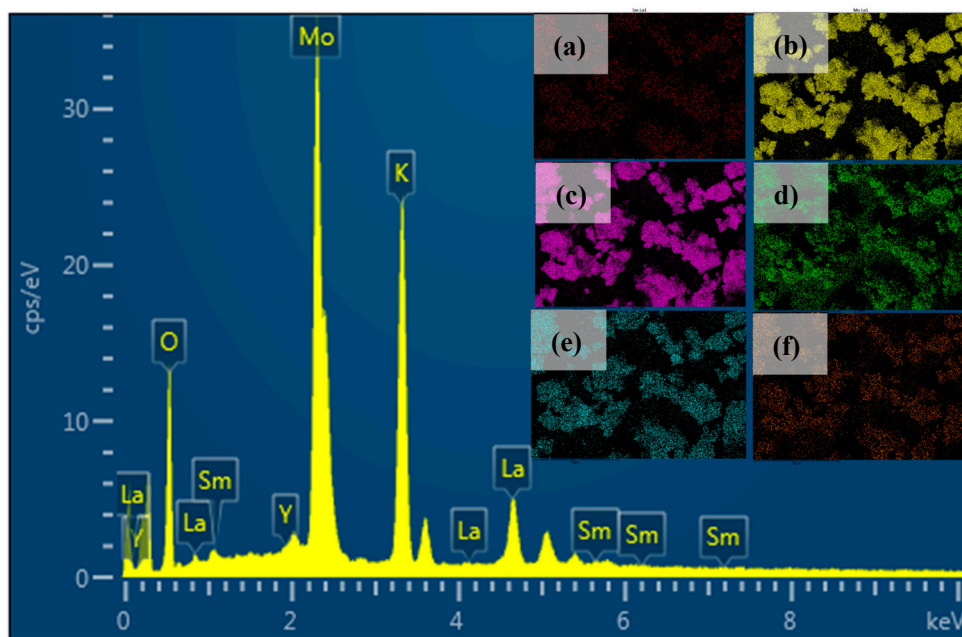


Figure. S6 The EDS and Mapping patterns of $\text{K}_5\text{La}_{0.86}(\text{MoO}_4)_4: 0.07(\text{Sm}^{3+}, \text{Y}^{3+})$ phosphors (insets a-f): Sm (a), Mo (b), K (c), O (d), La (e), Y (e).

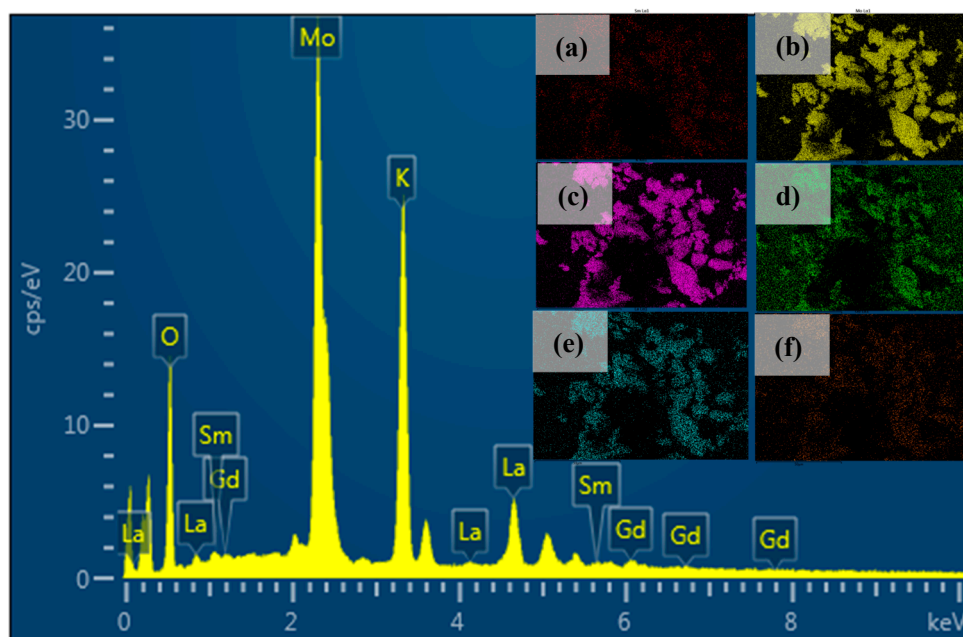


Figure. S7 The EDS and Mapping patterns of $K_5La_{0.86}(MoO_4)_4: 0.07(Sm^{3+}, Gd^{3+})$ phosphors (insets a-f): Sm (a), Mo (b), K (c), O (d), La (e), Gd (e).

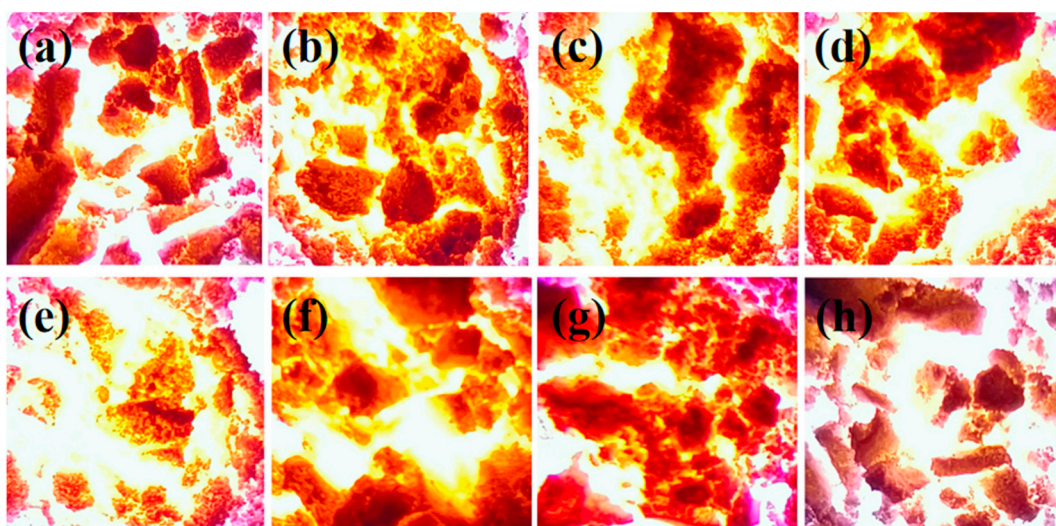


Figure.S8 Actual fluorescence photos of $K_5La_{1-x}(MoO_4)_4: xSm^{3+}$, $x= 0.005$ (a), 0.01 (b), 0.03 (c), 0.05 (d), 0.07 (e), 0.10 (f), 0.20 (g) and 0.40 (h).

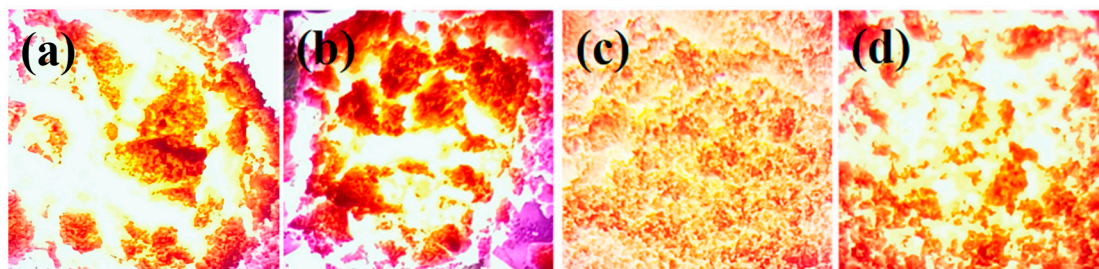


Figure.S9 Actual fluorescence photos of $K_5La_{0.86}(MoO_4)_4: 0.07Sm^{3+}, 0.07Ln^{3+}$ ($Ln = Sc, Y$ and Gd) phosphors: Sm (a), Sm+Sc (b), Sm+Y(c) and Sm+Gd (d).